GRID3

GEO-REFERENCED INFRASTRUCTURE AND DEMOGRAPHIC DATA FOR DEVELOPMENT

Mapping Subnational Boundaries: the GRID3 Approach

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Geo-Referenced Infrastructure and Demographic Data for Development (GRID3): A global partnership

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Oversight and Decision Making

Technical Expertise and Capacity Strengthening

Technical Support and Advocacy

Our Vision:

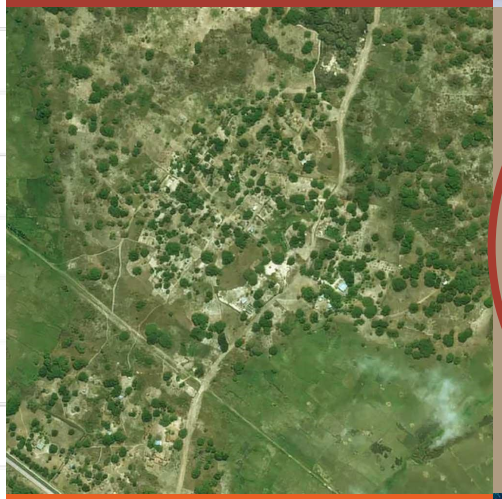
Mapping a path to sustainable development for everyone.

Our mission:

To build spatial data solutions that make development goals achievable.

Housing census & hybrid census support

High-resolution population estimates



Subnational boundaries

Comprehensive settlement locations

Locating critical infrastructure

Strengthening capacity

Functional Areas

Why is this theme fundamental?

Functional areas relate to, and support, the organisation and management of people, communities, society, and their activities in geographic space. These areas arise from human decisions. Linking data to administrative and functional geographies provides the spatial component that further enables data integration and broader comparability. It's also the key to informing stakeholders on the status of international, national and sub-national policy objectives and programme goals/deliverables. As a result, they are the building blocks of many processes relevant to sustainable development goals. Functional

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"It's also the key to informing stakeholders on the status of international, national, and sub-national policy objectives and programme goals/deliverables."

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sustainable development in a consistent way over time to facilitate evidence-based decision- and policy-making.

Existing geospatial data standards

Note: This is indicative. Other lists of standards exist and UN-GGIM will seek to work with thematic experts to develop a list of relevant data standards.

- INSPIRE Data Specification on Area Management/Restriction/Regulation Zones and Reporting units;
- INSPIRE Data Specifications for Administrative Units;
- INSPIRE Data Specifications for Statistical Units;
- INSPIRE Data Specifications for Protected Sites;
- ISO 14825 Intelligent transport systems-Geographic Data Files (GDF)-GDF5.0; and,
- ISO 19152: Land Administrative Domain Model (Spatial Unit Group).

http://ggim.un.org/meetings/GGIM-committee/9thSession/documents/Fundamental_Data_Publication.pdf

GRID3 Approach to Subnational Boundaries

Two strategies comprise the current GRID3 approach to improving subnational boundaries.

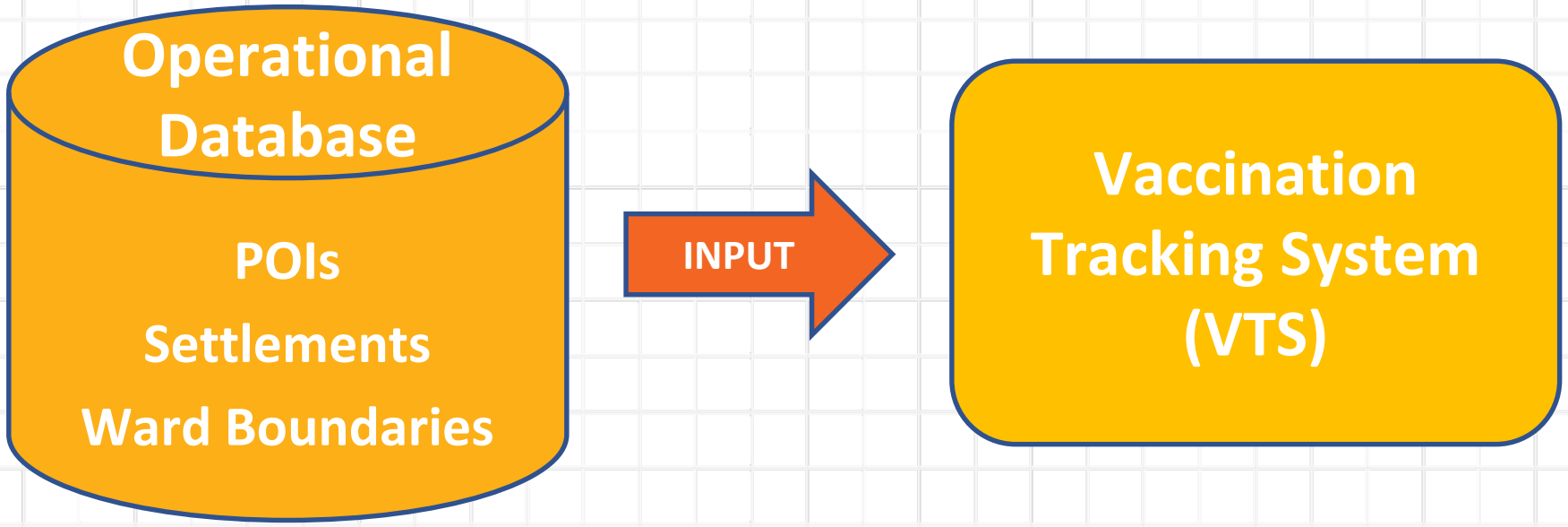
1. Facilitating the opening up of the boundary-generation process to local managers and officials for whom the boundaries constitute a central part of their operational responsibilities.

2. Facilitating coordinated, integrated participation in the boundary-generation process across government institutions that have formal authority for managing boundaries.

Strategy 1, Nigeria Case Study:
Data for Vaccination Campaign Planning

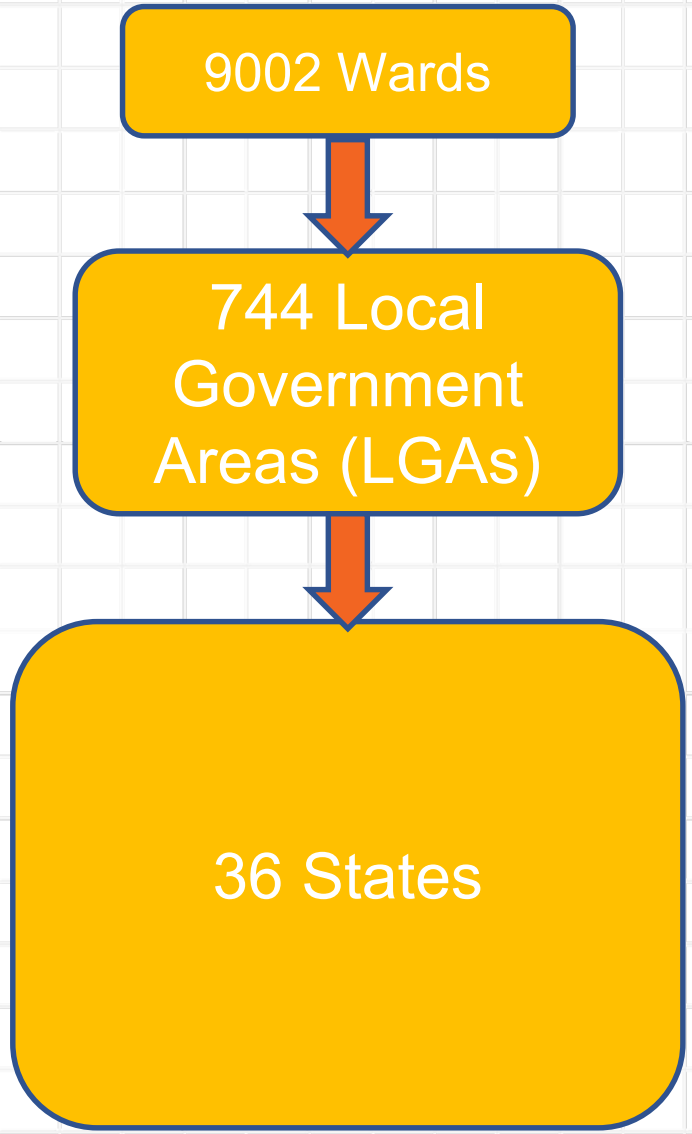
Compiled and maintained by eHealth Nigeria

Created by Novel-t and maintaind by eHealth

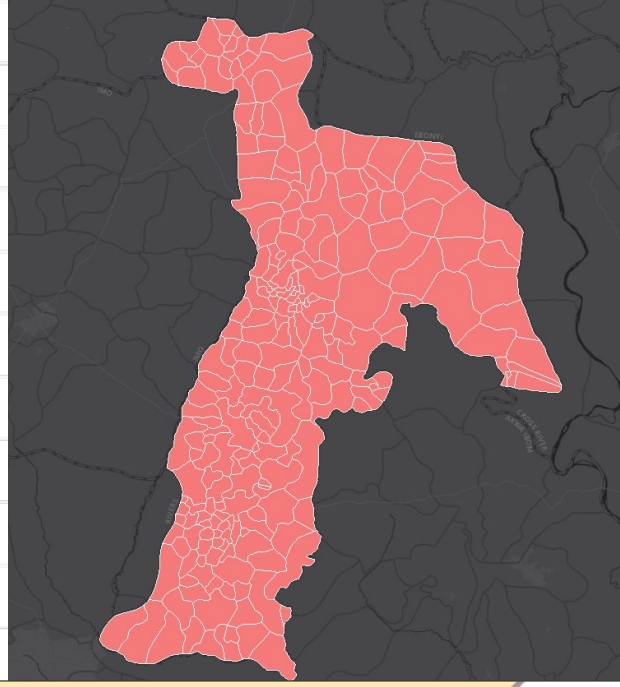


Strategy 1, Nigeria Case Study:
Data for Vaccination Campaign Planning

- Wards are the smallest administrative units in Nigeria
- They aggregate to local government areas (LGAs) and then to states.
- Currently, no open-source or government-accepted ward boundary data set exists
- GRID3 Nigeria goal: produce a quality data set of ward boundaries that can be officially accepted and used by the Nigerian government.

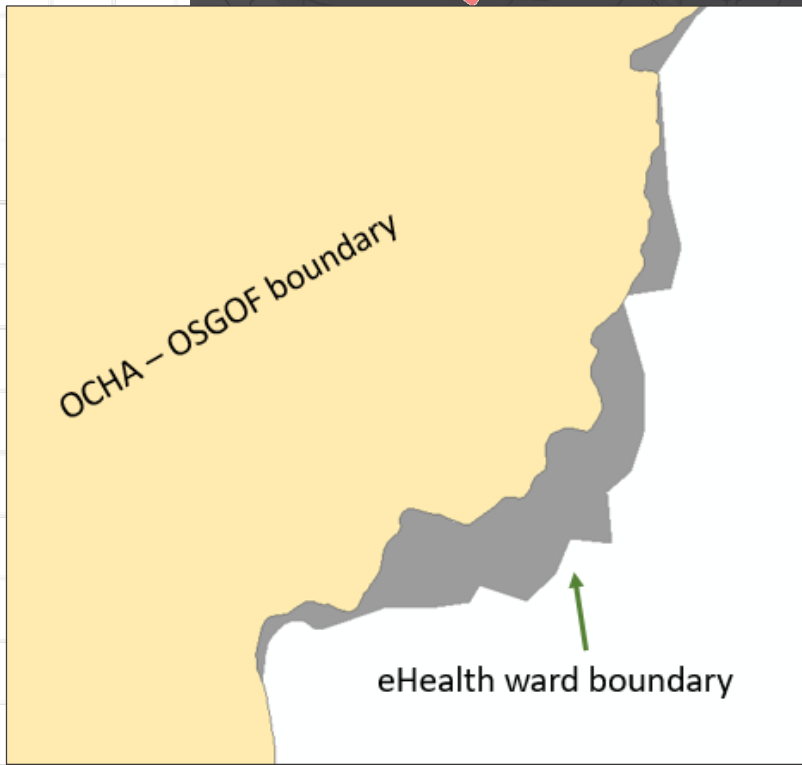


GRID3 Nigeria Ward Boundary Validation



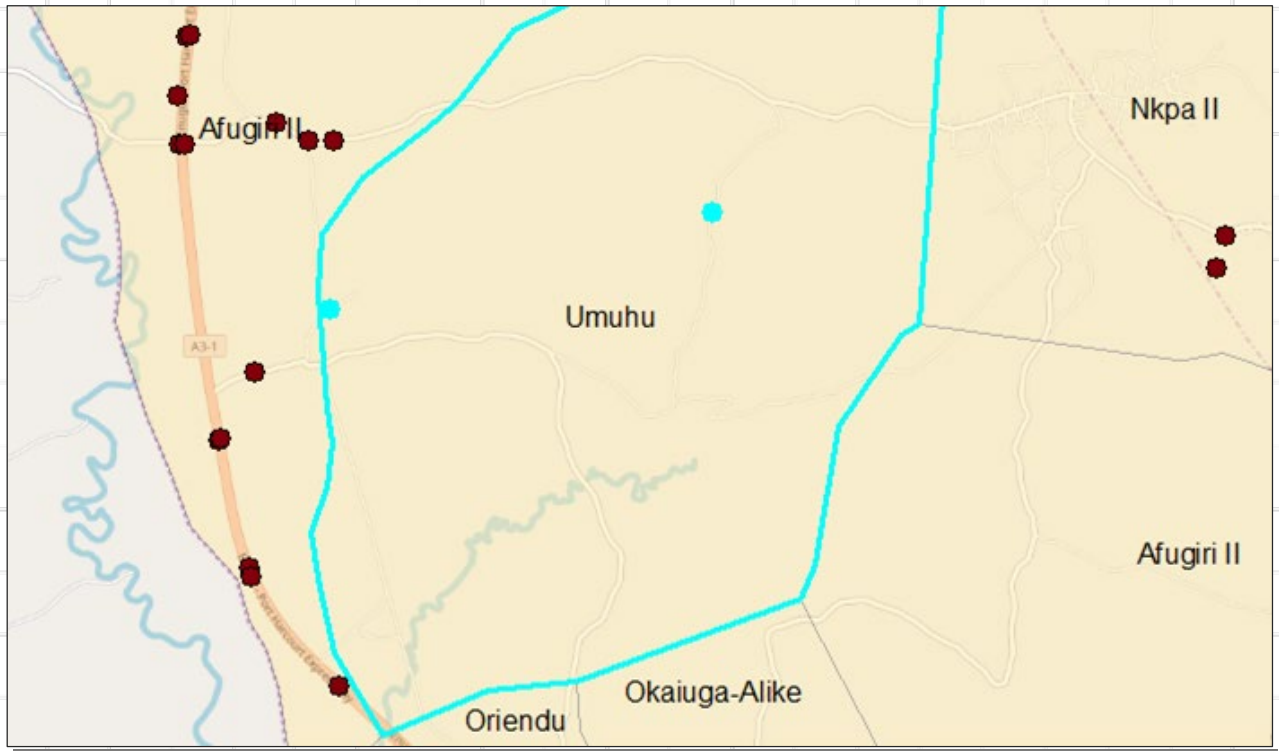
CIESIN evaluated the eHealth Nigeria ward boundaries using a set of data integrity checks.

- Unique operational ward ids
- Valid geometries and topology
- Alphanumeric ward codes (i.e. XYZ123)
- Multipart polygons
- Ward boundaries extending past the Nigeria country boundary



POI Spatial Anomaly (left) and Validation in Built Up Areas (BUAs, right)

Each point of interest and settlement feature should be located within the spatial limits of the ward and LGA specified in the point attribute table.



poi_wardcode	wardcode	poi_wardname	wardname	poi_lgaco	lgacode	poi_outside_ward	poi_outside_lga
ABSACH03	ABSUMA16	Arochukwu III	Umuhu	1003	1016	True	True
ABSABA01	ABSUMA16	Aba River	Umuhu	1002	1016	True	True

Errors reports for all checks were sent back to eHealth to address, and then boundaries re-checked.

Boundaries should follow a natural or man made feature (e.g. road, rails, rivers, etc)

The highlighted line segment is following the road
→ ***No Error***

The highlighted line segment crosses over multiple buildings
→ ***Error***

GRID3 Nigeria

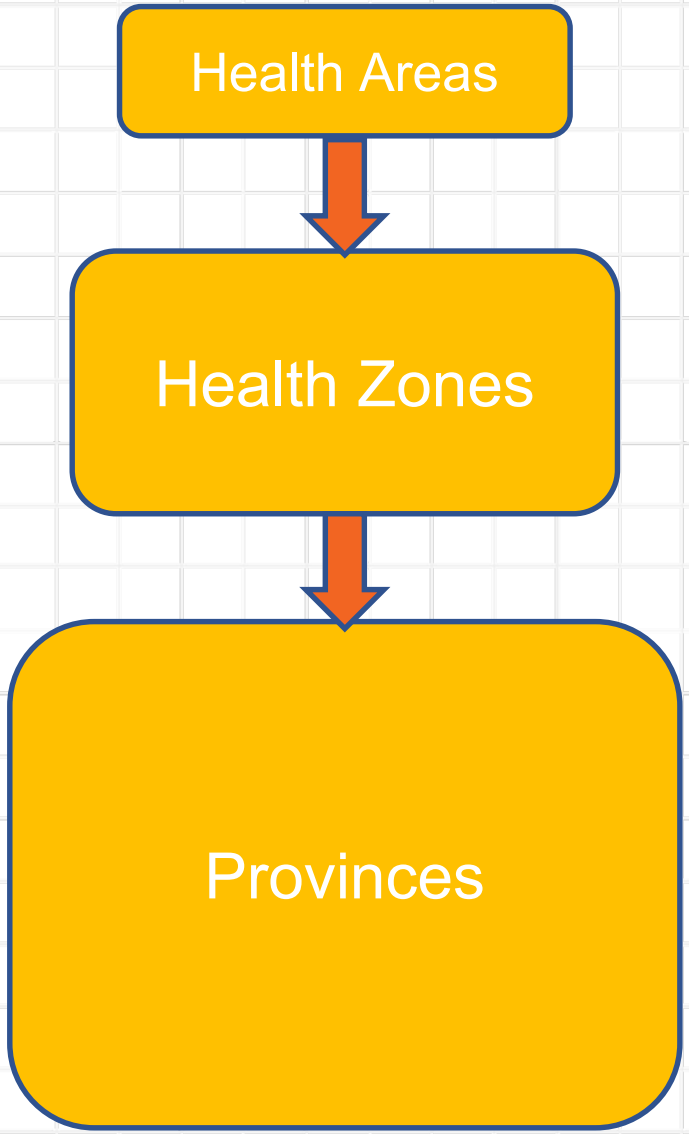
Ward Boundary Outcomes

- As of April 1, 2019, the boundaries are complete, free of topology errors, and consistently named across administrative levels and points of interest.
- The GRID3 Nigeria geodatabase will be hosted by the National Space Research and Development Agency (NASRDA) which has the mandate for managing the NSDI
- As such they have a “government stamp”, but do not have official status until reviewed and approved by the mandated agencies.
- The entire process was accomplished in the open, under the auspices of a multi-agency steering committee, and the boundaries are already in use.

Strategy 1, DRC Case Study:

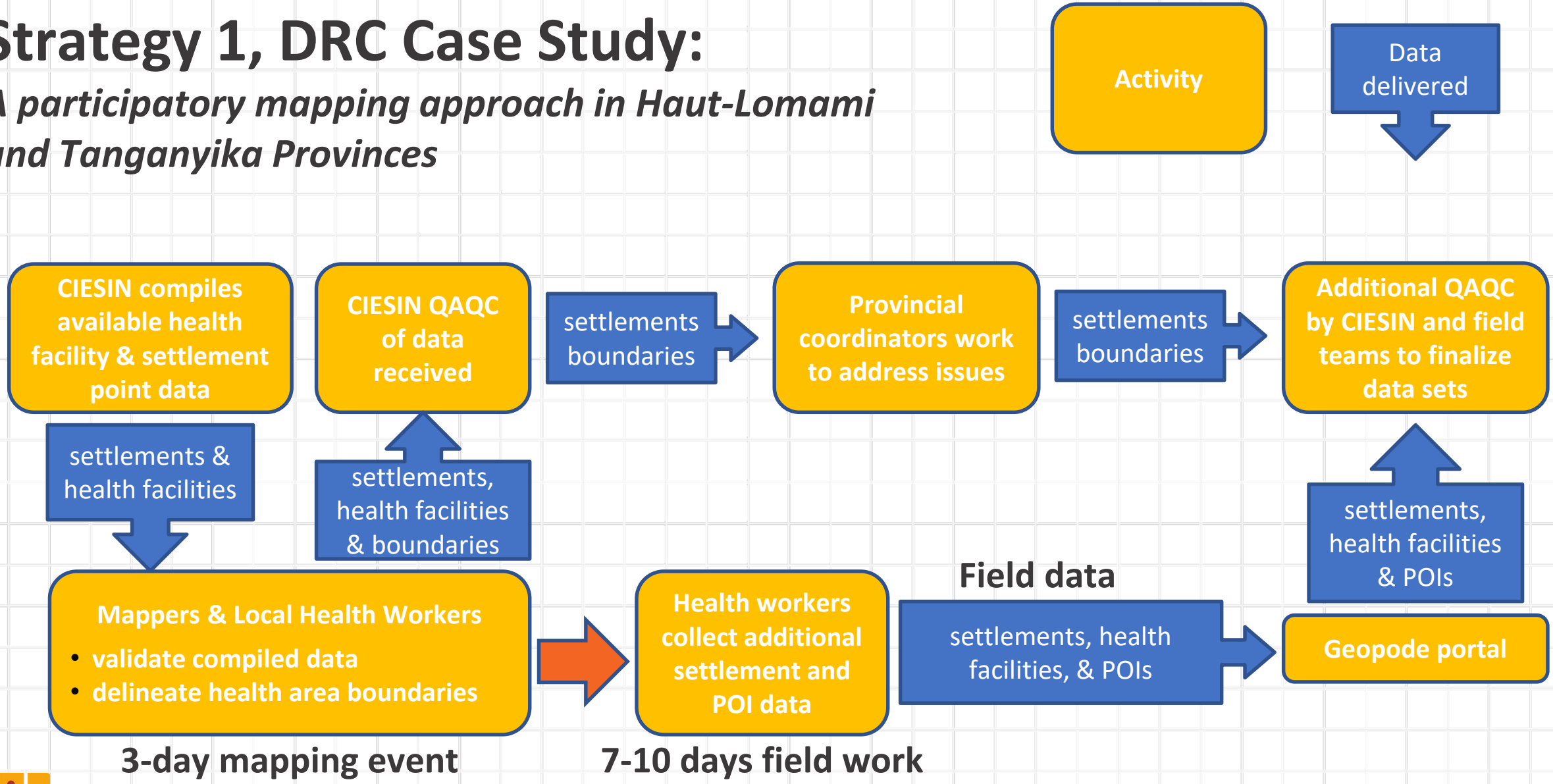
A participatory mapping approach in Haut-Lomami and Tanganyika Provinces

- Health service delivery is organized at the Health Area (HA) level.
- 20-30 HAs aggregate to Health Zones (HZs) and then to Provinces.
- GRID3 DRC goal: produce a quality data set of health area and health zone boundaries that can be officially accepted and used by the DRC ministry of health.

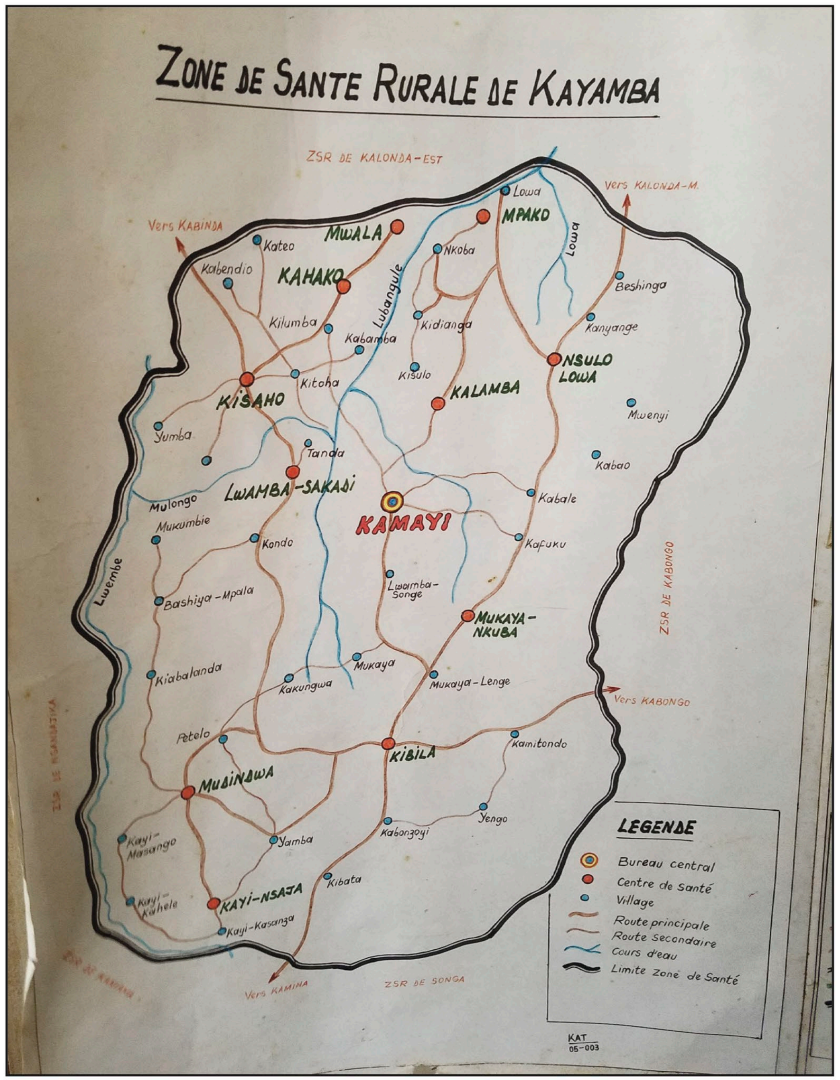


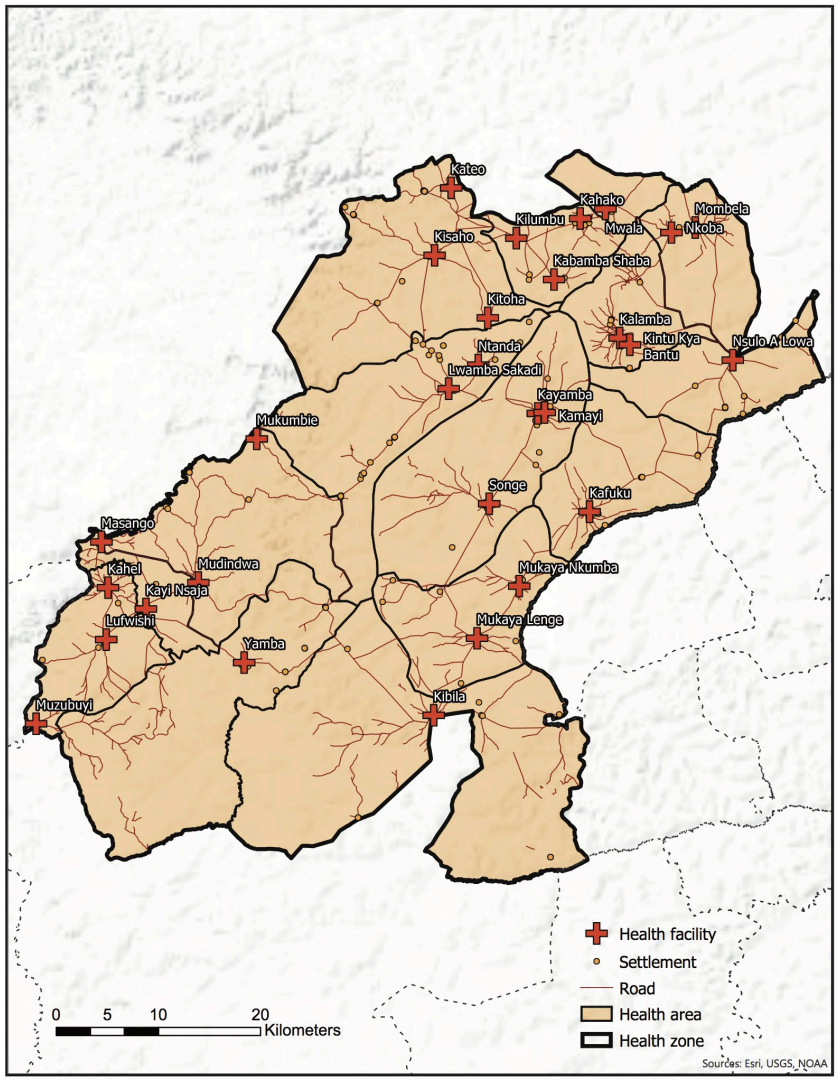
Strategy 1, DRC Case Study:

A participatory mapping approach in Haut-Lomami and Tanganyika Provinces



Hand-drawn Operational Map (left) and a New Digital Map (right)

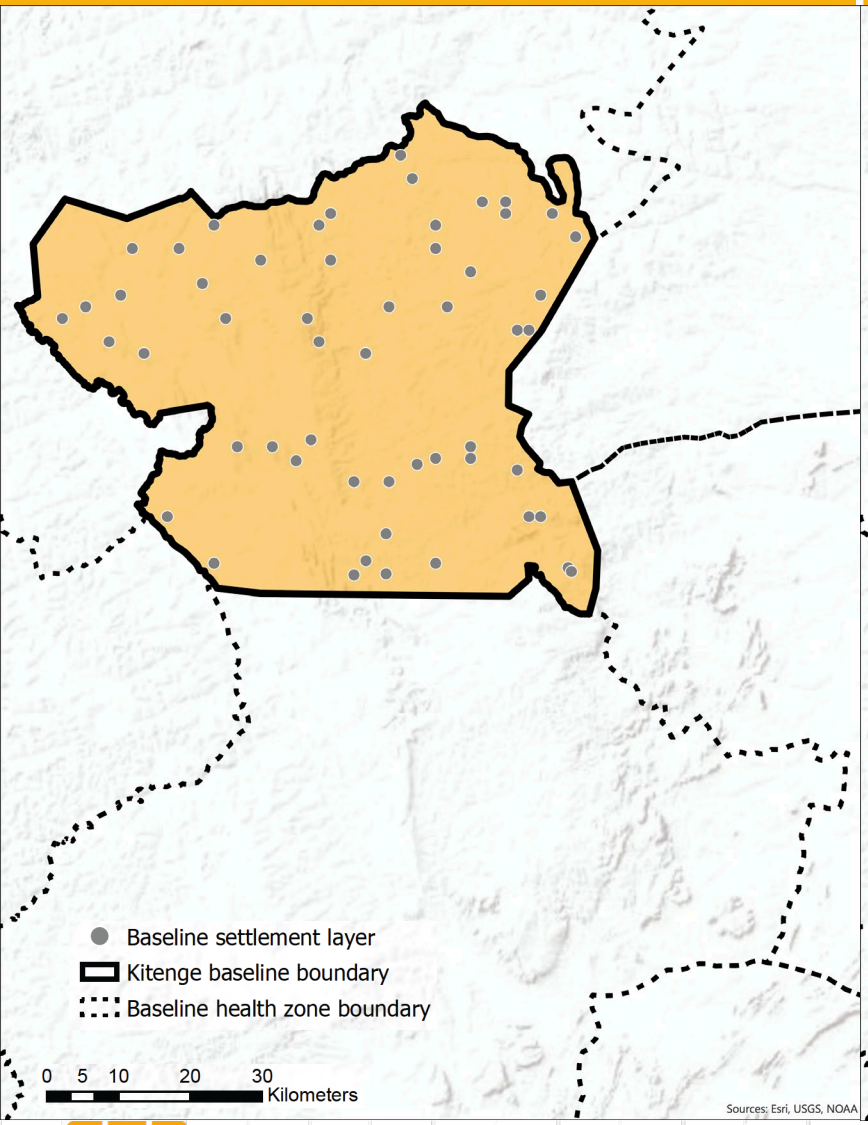




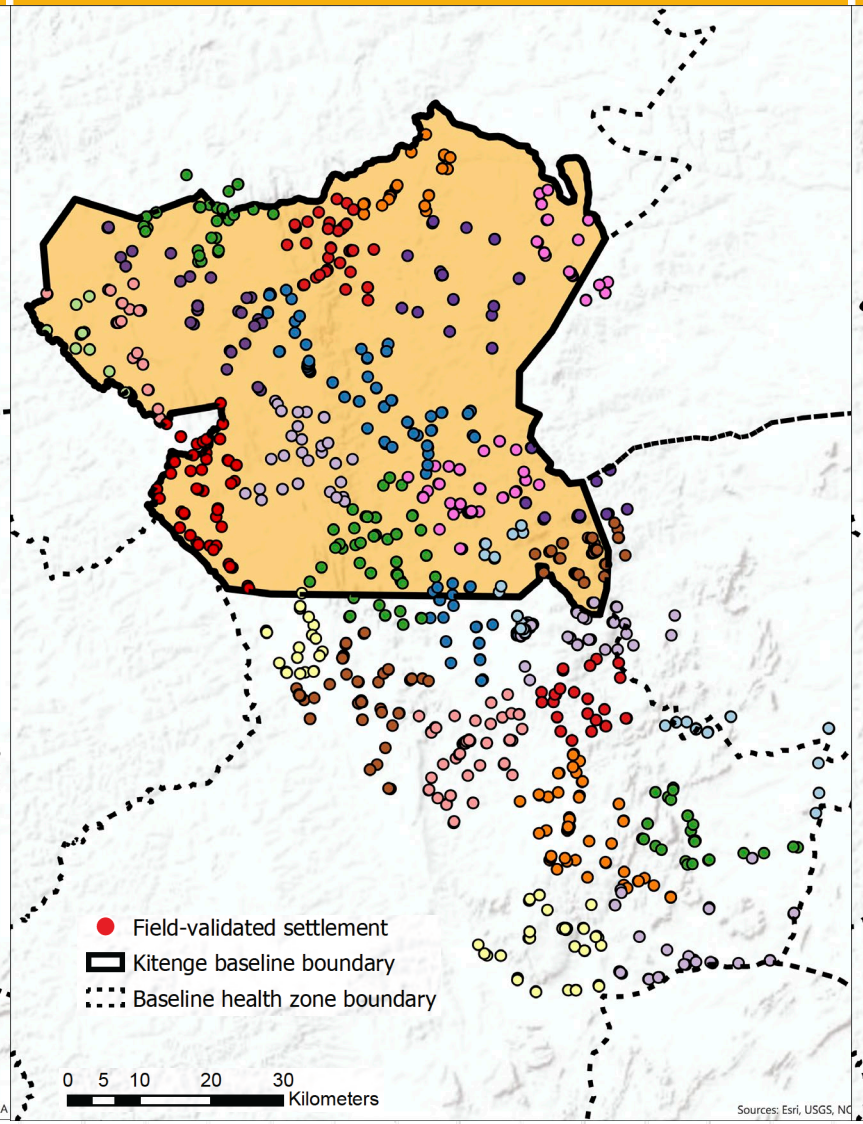
Kayamba Health Zone

Haut-Lomami, DRC

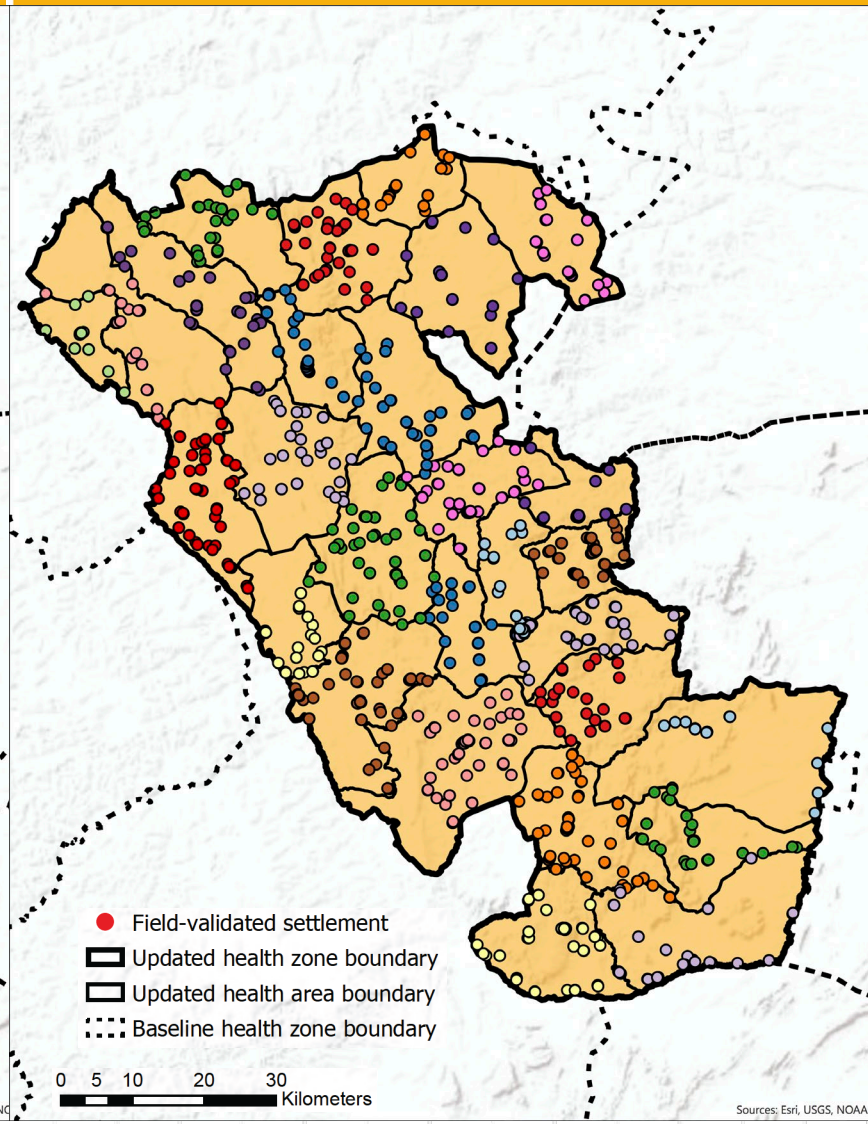
Baseline data from OpenStreetMaps



Compilation of Existing Data & Field Collections



Delineation of Health Areas

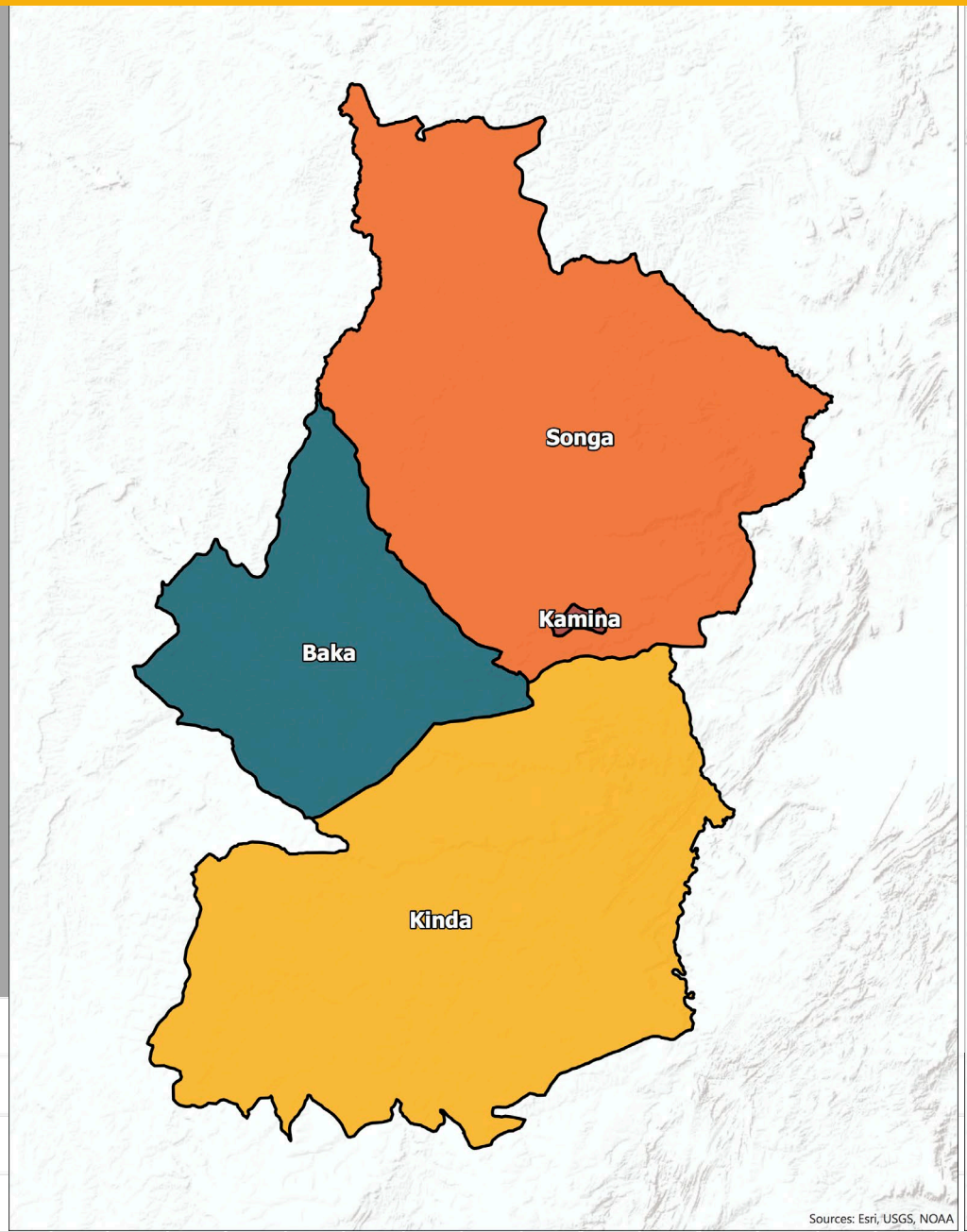


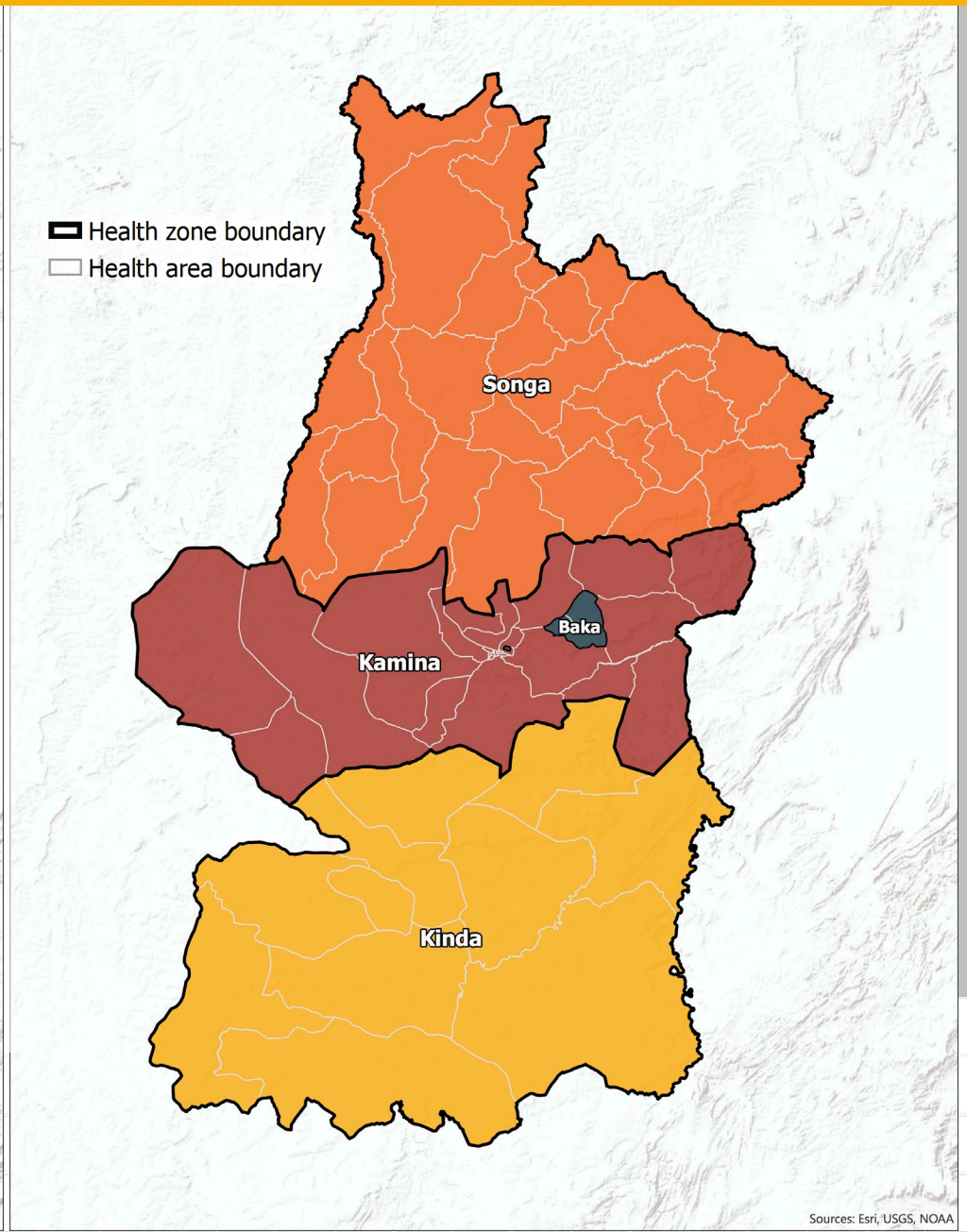
Named settlement locations collected during the April 2019 VTS polio vaccination campaign. Points are symbolized by color according to health area.

Delineation of Kitenge Health Areas

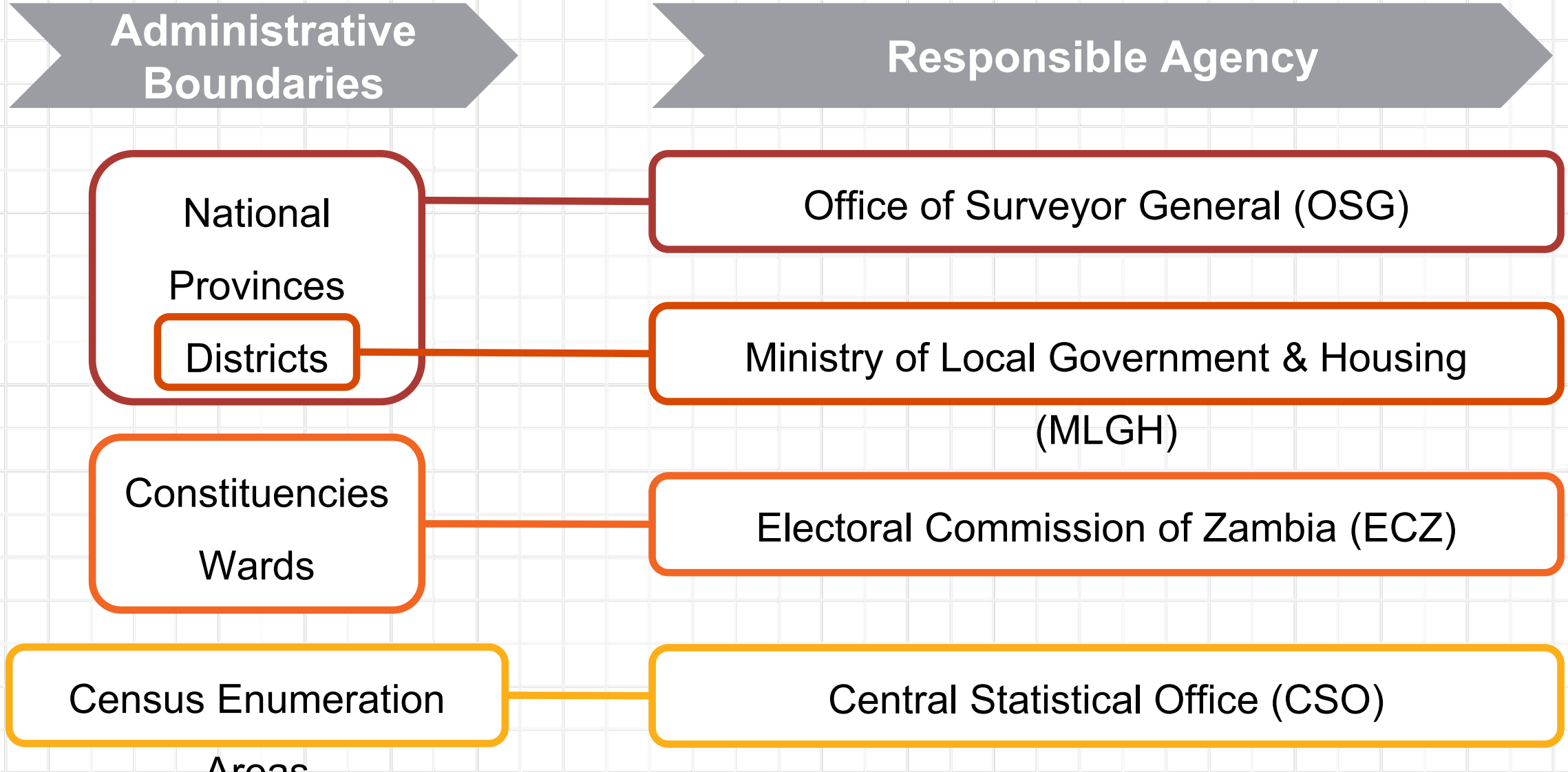
(Haut-Lomami Province, DRC)

Haut-Lomami Health Zones, Before and After Field work

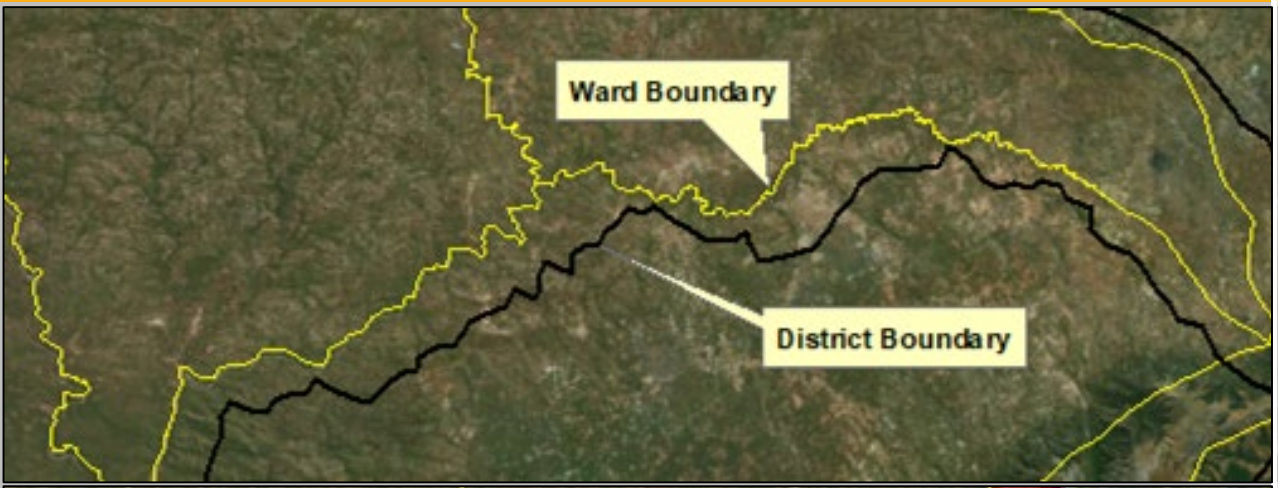


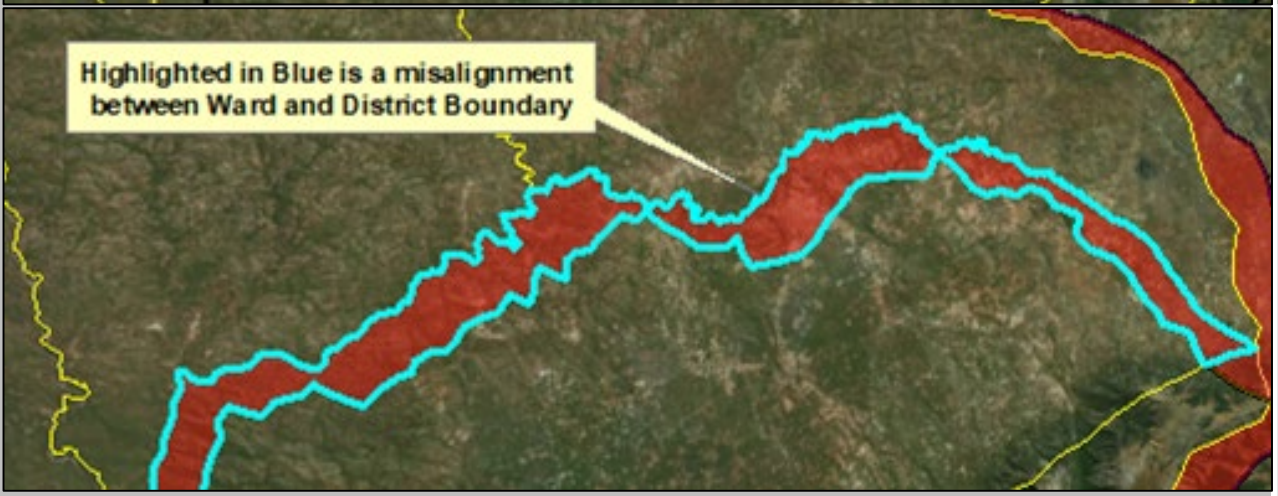


Strategy 2, Zambia Case Study:
Inter-agency boundary harmonization

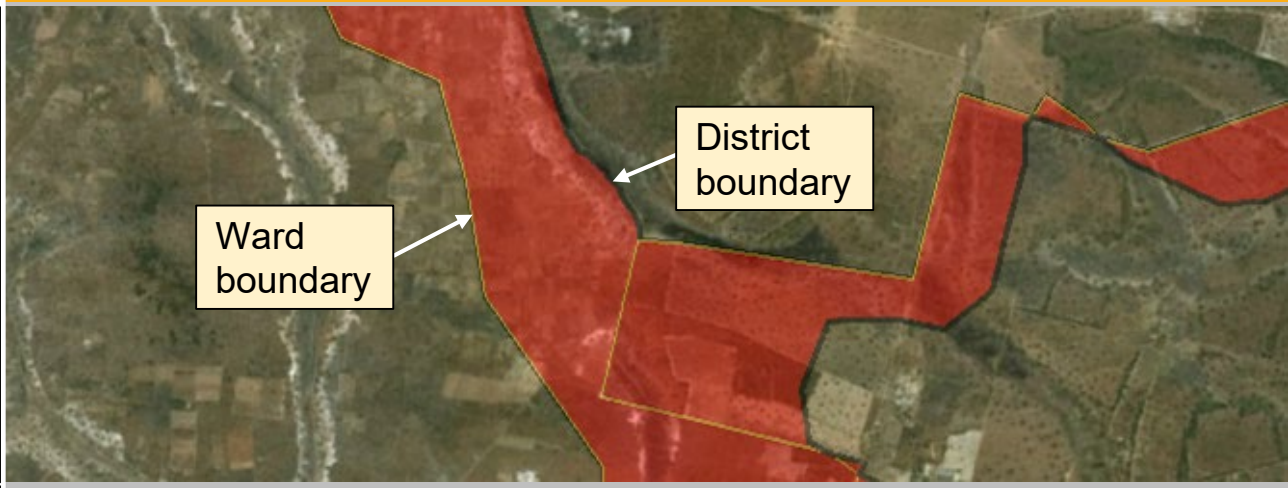


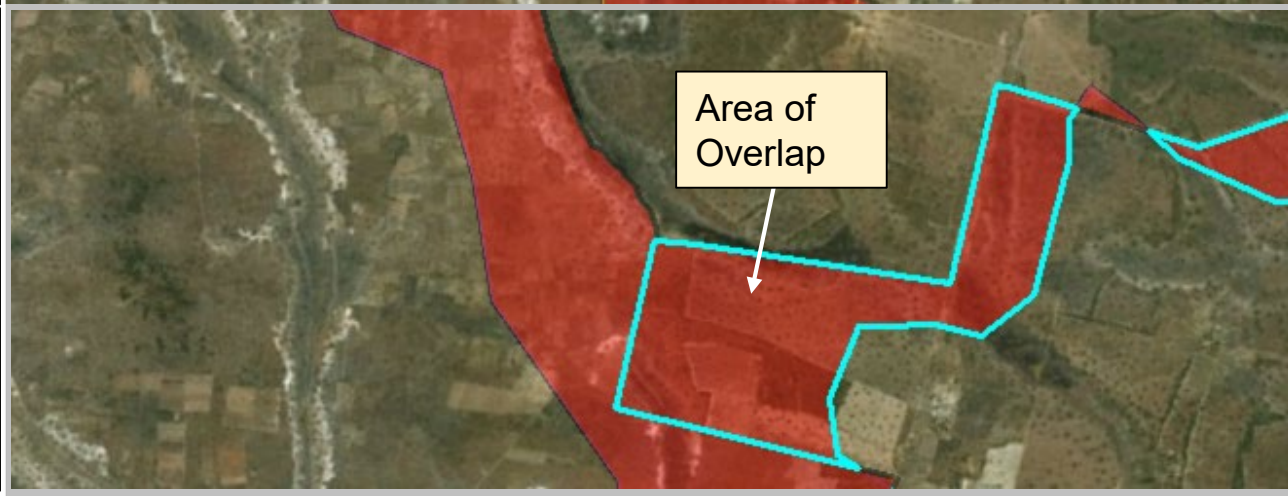
Gaps





Overlaps





Administrative Boundary Misalignments

Boundary Harmonization Plan

Coordination & Work Plan Development

- Following the GRID3 mission to Lusaka November 2018, CIESIN worked with OSG, CSO, & ECZ to develop a work plan.
- GRID3 National Coordinator met with NSDI Project Manager, ECZ GIS technicians, the Head of Census Mapping, and Surveyor General finalize the work plan
- Focus on harmonizing districts, based on district narratives, and any wards that share a boundary with a district

Boundary Analysis

- Conducted by CIESIN with a custom tool built in ArcGIS model builder.
- Identify misalignments between districts, and between districts and wards sharing a boundary
- Eliminate **gaps** and **overlaps** less than 500 meters square in order to reduce the number of manual edits to complete during the workshops.

Workshop Goals

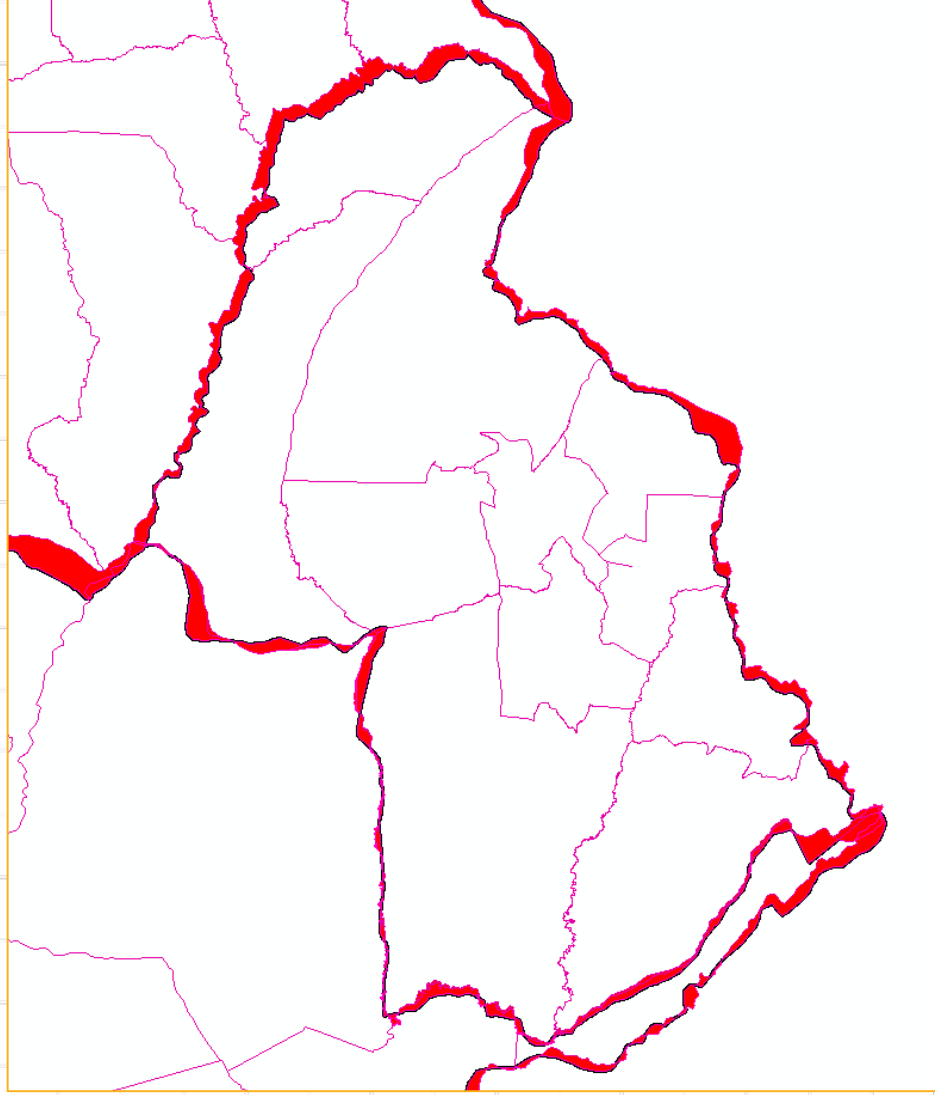
- Bring together members from all responsible agencies
- Reconcile district boundaries to official narratives and align to topographic features
- Reconcile ward boundaries shared with district boundaries

Boundary Harmonization Workshop 1

Participants

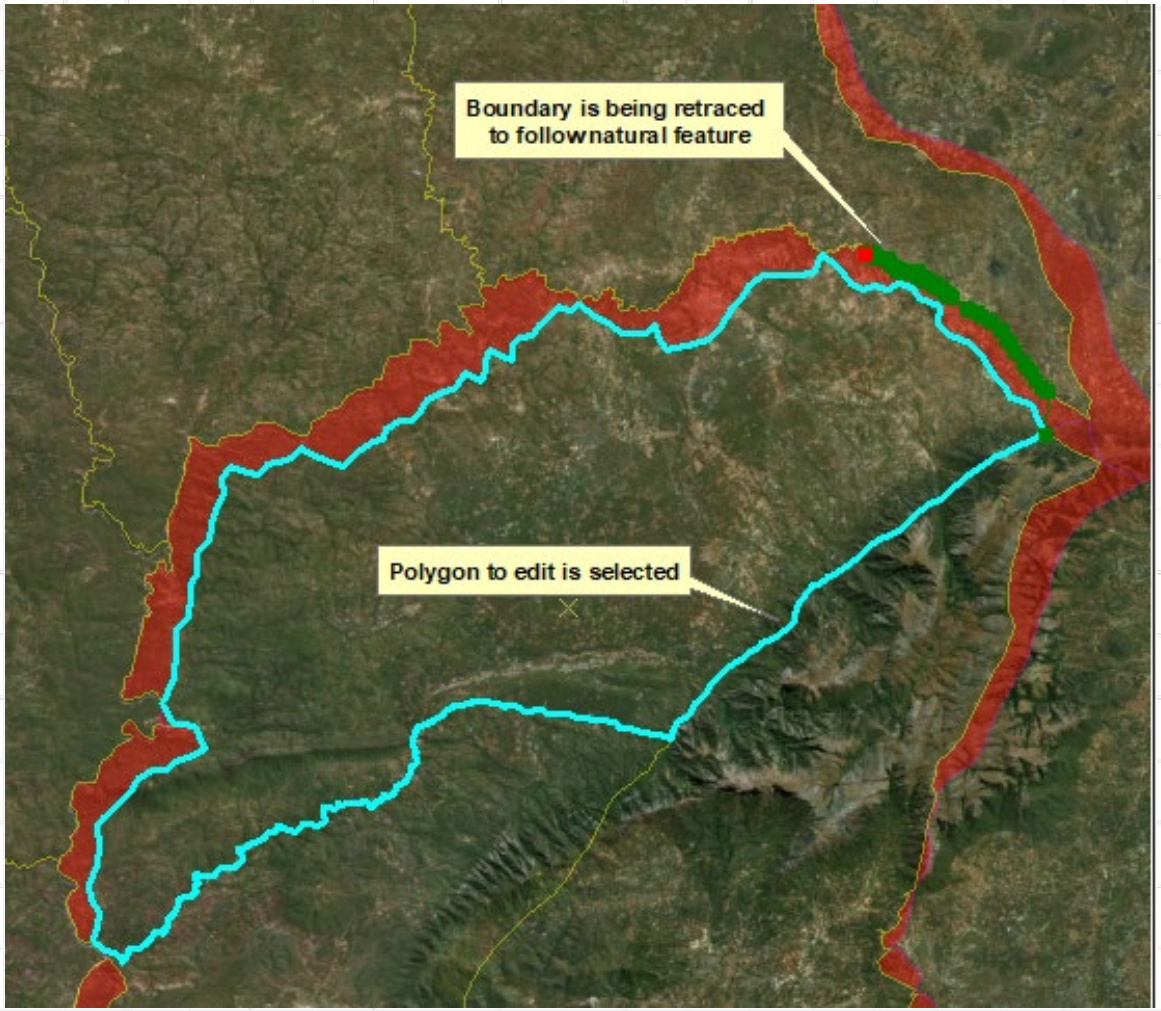
OSG, MLGH, ECZ, CSO and UNZA

- One government representative read aloud the narrative for a district and its neighboring districts, while a GIS specialist panned around the map to follow the narrative description
- Ward boundaries were matched to the districts by referring to natural features, roads, farm plots, and beacons from the narratives



Red areas represent areas of misalignment

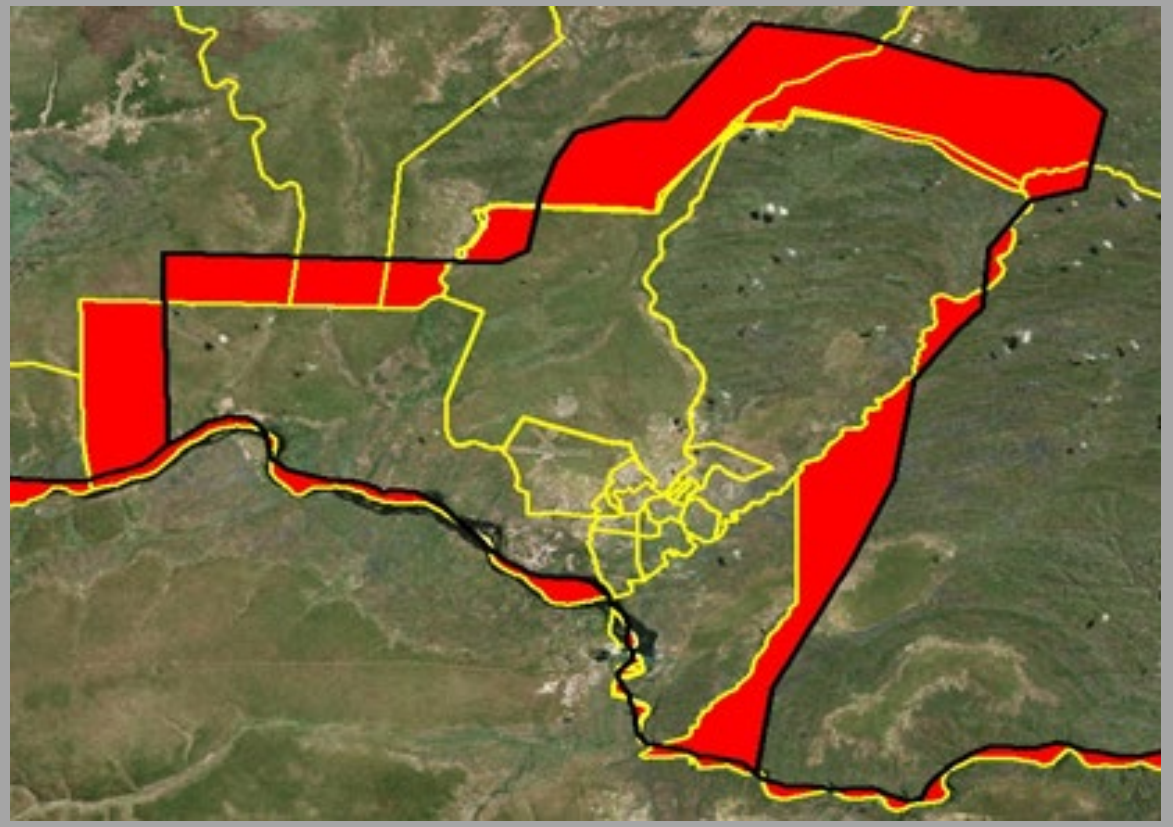
Boundary Harmonization Workshop 1



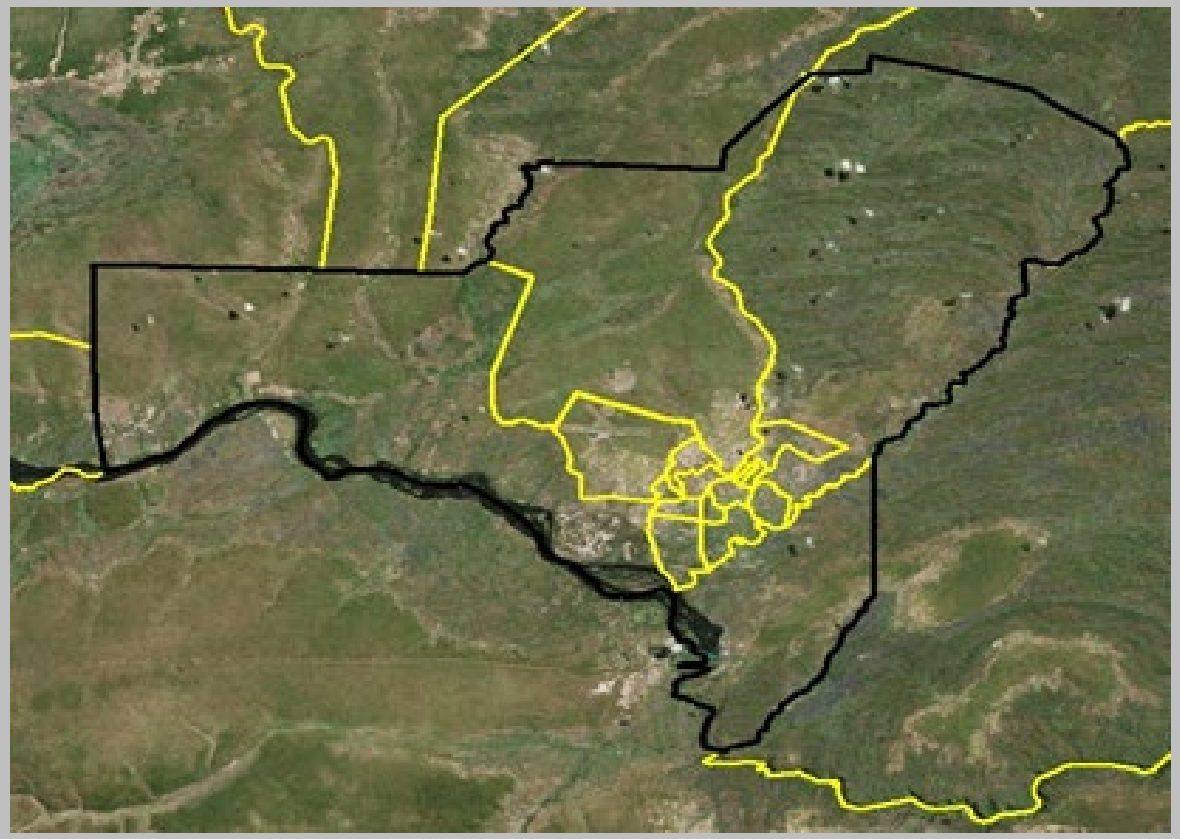
- A gap or overlap polygon from the editable layer was either merged to the correct district or retraced

- Edits were documented in the point layer as either 1) change made to ward boundary, 2) change made to district boundary, or 3) retracing of the boundary.

Before Boundary Harmonization



After Boundary Harmonization



Boundary Harmonization Worksop 1

Workshop: Editing Session II

- Workshop participants split into five groups of three people

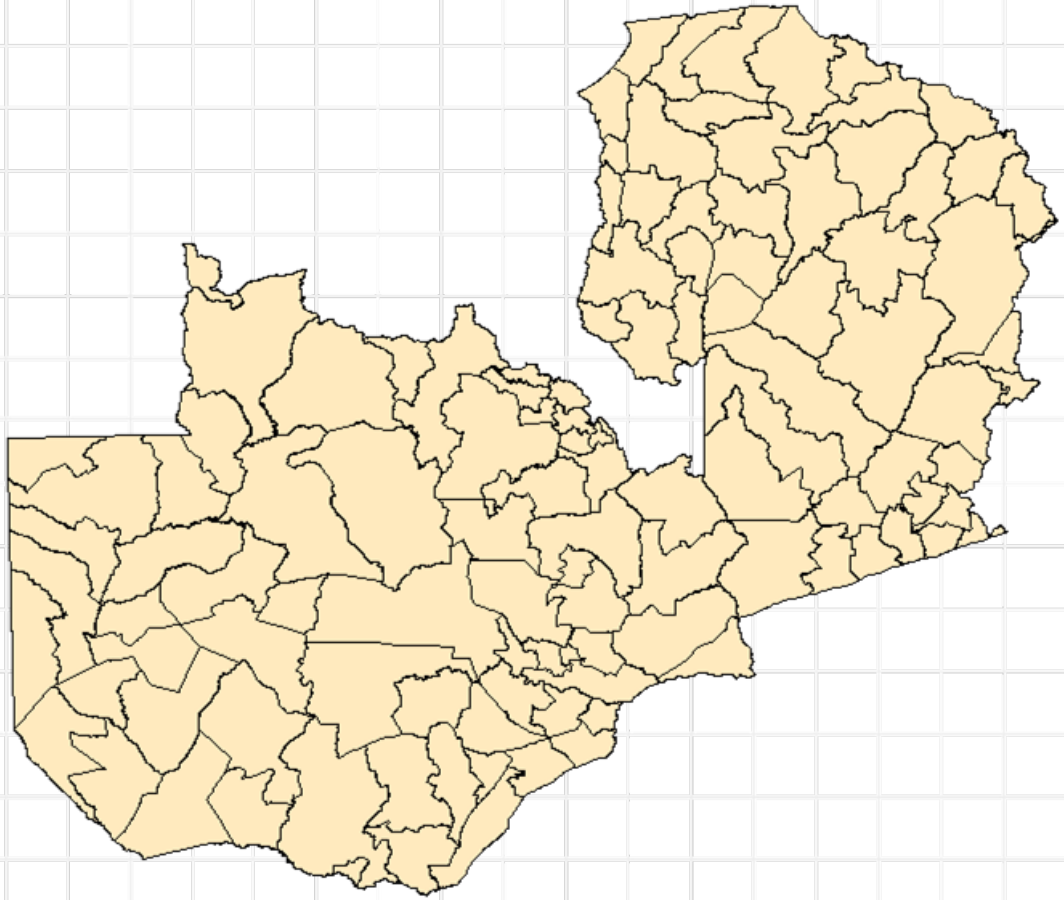
- One person in the trio was responsible for reading the district narratives and referencing the topographic map and imagery, the second person performed the edits, and the third member recorded the edits in the point layer

Boundary Harmonization Workshop 2

Participants

OSG, MLGH, ECZ, CSO and UNZA

Outcomes from the Workshops



- All 116 district boundaries were aligned
- Wards sharing a boundary with a district were aligned
- Consensus reached on code assignments to the provinces and districts (OSG with input from ECZ and CSO)
- Errors in the narratives were identified

GRID3

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